

The Financial Post

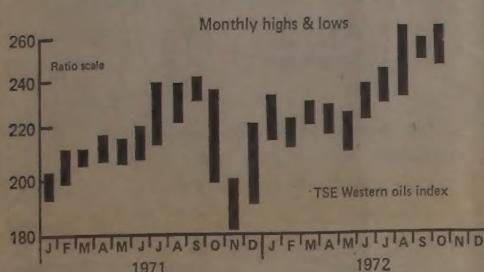
Fourth Section

November 25, 1972

Pages 0-1-0-8

Oil stocks heading for new high ground?

311-----1969 Prudhoe Bay high



Major discoveries sought

It could be an active year for oil stocks

"This is going to be a hot winter up north and I'm not referring to the temperature."

The oil analyst was referring to speculative heat — the kind that will likely be given off by the biggest winter drilling season yet in the Canadian Arctic.

With a total of 14 drilling rigs active in the Mackenzie Delta and 13 in the Arctic Islands, a record 50 or more wells can be punched down by late next summer.

Based on the success ratio to date, the greatly enlarged program and the improving seismic knowledge, some successes seem certain.

Add to this the growing investor excitement in the North Sea play and Canadian

year and a half. Some have retained petroleum engineering consultant services in Western Canada and Britain, and are being fed up-to-date reports on movement of rigs, drilling progress and other industry moves.

In the North Sea, just the announcement that a rig is to be moved onto a particular block provides sufficient speculative steam to bring buying into both the shares of the members of the drilling consortium and those companies holding nearby blocks.

Generally speaking, investor interest builds up steadily in a drilling venture the further towards completion the well is carried. Some nimble traders never stick with a venture to its completion but bail out before results are likely to be known. The proceeds are then reinvested in another drilling venture in the early stages.

The former, clearly marked seasonal patterns in the Canadian oil market are gradually disappearing as a result of advancing technical know-how and more sophisticated drilling equipment. Drilling can be carried right through the year on the Delta, although it is still impossible to move rigs during the spring break-up season.

Drilling in the northernmost sector of the North Sea must be sharply reduced during the stormy winter months. But even there drilling will be carried on right through the year with the delivery of new heavy semisubmersible drilling rigs.

Imperial Oil Ltd. will again be by far the most active operator in the Mackenzie Delta this winter. It will have five rigs drilling on its 100% owned land, and one on acreage shared with Canadian Industrial Gas & Oil Ltd. (Cigol) on the Tuktoyaktuk peninsula.

The recent Imperial announcement that its Ivik J-26 test resulted in an oil discovery — the first one for the Delta — will attract more investor interest than ever into this winter's program.

Shell Canada Ltd. will have two rigs operating in the Delta this winter. Shell is also participating in the Reindeer area test with Gulf Oil Canada Ltd. and Imperial.

Gulf has three deep-capacity rigs in the Delta this winter. The company recently announced abandonment of its northernmost wildcat, drilled by Gulf for itself and partner Mobil Oil Canada Ltd. The well is 77 miles northwest of Inuvik.

Gulf will drill a third well in the Parsons Lake area where one well previously encountered gas-bearing sands. Another well will be drilled on Richards Island.

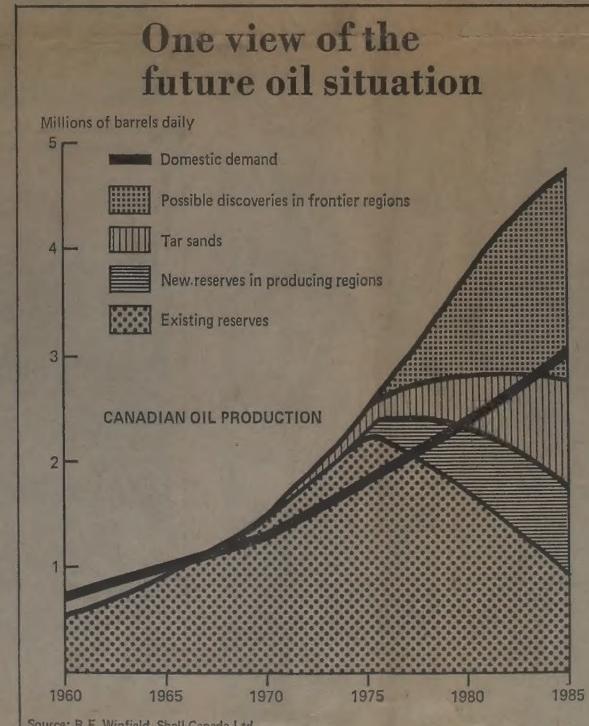
Chevron Standard Ltd. has a deep-capacity rig near Shell's Niglinaq location.

Union Oil of Canada Ltd. plans to drill a Devonian test in the Delta region as soon as freeze up permits rig movement. The test will be 12 miles south of Akavik and about 90 miles south of recent Imperial Oil discoveries.

This is going to be the most active drilling season yet in the Arctic Islands with 13 rigs available and all of them committed over the next few months.

To date there have been three potentially major gas discoveries and two promising oil shows — one at Romulus on Ellesmere Island and one on Thor Island, southwest of Ellef Ringnes Island. There is increasing interest in proving threshold quantities of gas necessary to justify the huge expenditure for bringing the gas to southern markets. This is placed at around 25,000 billion cubic feet.

Panarctic Oils Ltd. syndicate, representing a 45% interest of the federal government with the remainder held by 19 Canadian and U.S. mining, oil and industrial firms — will again be the most active operator in the islands. The Syndicate will be using four rigs and drilling both for its own (100%) account and its interest —



with others — in land owned by other groups.

Dome Petroleum Ltd., Gulf, Imperial, BP Oil Canada Ltd., Sun Oil Co., Demex Canada Ltd., Horn River Resources and Elf Exploration & Production (Canada) Ltd. all have rigs under contract.

Some two dozen firms will be closely affected either through participation in actual drilling ventures or through their interest in nearby properties.

On the basis of drilling plans already announced, wells will be drilled on Axel Heiberg Banks, Ellesmere, Ellef Ringnes, King Christian, Emerald, Eglinton and Melville Islands.

Dralarctic Joint Venture — composed of Bow Valley Industries, Kenting Ltd. and Westburne Petroleum — will join with another consortium, Horn River Resources, to drill at least two and probably three tests on Axel Heiberg Island. The first well, already under way, is believed to be a 50% farmout of Panarctic's half interest. Other participants are Great Plains Development Co., Hudson's Bay Oil & Gas Co., Bankeno Mines Ltd., Ashland Oil Canada Ltd., Plains Petroleum Ltd. and Lassiter Kumia Oils Ltd.

A third location on Axel Heiberg will be drilled by Imperial on a large farmout from Panarctic.

Dome will drill two wells on King Christian Island to test potentially gas-bearing structures. These wells will be

(Continued on p. O-2)

The petroleum drama: nationalism vs demand

By W. L. Dack

Exploration over a broadening front, firming plans for the most ambitious pipeline project ever proposed, and soaring oil and gas market potentials highlight Canada's petroleum situation today.

Add to that a strong tide of nationalism that would keep "Canada's natural resources for Canadians" and an increasingly vocal concern for the northern environment and you have all the elements of exciting drama.

The vital winter exploration under way in the Far North is focusing great interest on the next few months' drilling results.

With more companies and more rigs moving into both the Mackenzie Delta and the Arctic Islands, and operating from steadily improving geological knowledge, the prospects for success are better than ever.

At the same time, the tantalizing East Coast hunting ground is grudgingly starting to give up more of its secrets.

And coming up rapidly as a great potential oil producing region for nearly three dozen Canadian firms is the North Sea.

These three frontier areas will attract most Canadian exploration efforts over the next two to three years. The results could radically alter the present pattern of the Canadian oil industry, boost the stature of some drilling companies tenfold or more.

All three areas are exceptionally high-cost hunting grounds, where even the big internationals are spreading their risks by entering consortia undertakings. For the small and medium-sized exploration companies, group undertakings are a must.

The economic factors supporting such high-cost programs are the rapid rate at which the rising world energy demands —

and particularly those of the U.S. — are eating into petroleum reserves and the certain knowledge that both oil and gas prices are embarked on a rising price trend.

Although the Middle East producing countries have so far not placed any limitations on oil production rates they are relentlessly forcing prices upward by their higher "takes" in taxes and direct ownership in the foreign-owned producing companies.

For Canadian oil the opportunities of participating to a greater degree in this fast-expanding energy market of the 1970s will depend on the harnessing of huge new reserves of frontier oil and gas. And this means a whole new ball game.

Production a record

Oil and gas liquids production from developed Canadian fields (which has been hitting a record rate this year at around 1.8 million barrels daily) will likely start to level off within three or four years, and then start a slow decline. Rising production from the Athabasca tar sands may only partially offset the decline.

The supply picture is just about as tight for natural gas. Last year, the National Energy Board turned down a gas export bid on the grounds of insufficient supplies surplus to Canada's own long term requirements.

Clearly, on market considerations alone, a strong case is building up for early development of the frontiers where large reserves of gas have already been outlined and promising oil zones penetrated.

But connecting these remote reserves into commercial markets poses economic and political problems of nationwide proportion.

Here is the situation:

The economic viability of building oil and gas pipelines out of the Arctic depends on the design and construction of large-diameter lines that must operate at high capacity rates right from the start — rates far beyond Canadian requirements. The obvious supplemental markets to fill those requirements are in the U.S., which already takes 50% of both our oil and gas.

The building of such a transmission system means dedicating of a large part of Canada's frontier oil and gas reserves to the U.S. market. It also means a much closer tie with the U.S. and its energy situation with its inevitably rising energy costs.

Several Canadian economists claim the construction of a \$4,000 million-\$6,000 million gas pipeline from the Mackenzie Delta would cause such a distorted demand for Canadian dollars that the C\$ would rise enough towarf the competitive position of our manufactured exports.

But pipeline company officials claim this effect can be minimized.

For one thing, they say, the dollar drawdown on construction financing can be stretched out over a three-year to four-year period. And a considerable part of foreign financing can be used to purchase abroad essential goods and services that are not available here, thus reducing the run on the C\$.

Anyway, the overall benefits to Canada — the boon to our balance-of-trade, the beneficial side-effects on certain industries, the economic benefits for the North — would far outweigh the possible temporary economic disruptions, the pipeline people say.

To weigh both sides

But a feeling is growing strongly, both inside and outside government, that this is the time before Canada becomes fully committed on a huge second energy development phase, to weigh all the pros and cons — as many as can be assembled.

And if we decide to go ahead, we must fit the project into a timetable that would cause the least disruption and greatest economic benefits for the country.

In the meantime, oil industry and consulting engineering experts, already working on how to build such an Arctic gas pipeline and its probable effects on the environment, claim such a system can be built and that its construction and operation would have only minor adverse impacts on the environment.

Debate will be loud and long over the next few months on every one of the controversial aspects surrounding the pipeline issue. It will probably reach its zenith about the time the powerful consortium of Canadian and U.S. companies sponsoring the project makes its application before the National Energy Board.

All yardsticks look good

This has been another excellent year for the petroleum industry with almost all the performance yardsticks showing good gains:

- Production of liquid hydrocarbons — conventional and synthetic crude oil and natural gas liquids — has risen by an estimated 15% for a daily average of around 1,850,000 barrels.

- A further sharp gain in oil export has been the biggest factor in the rise. Total exports are running 22% ahead of last year at approximately 990,000 barrels per day (b/d). This is the first year export demand has exceeded domestic demand. The big jump in exports reflects the further U.S. easing in oil import quotas, particularly east of the Rockies.

- Canadian crude oil imports into the oil and gas industry is estimated to show hefty annual gains with an increase of 11% to an estimated 7,600 million cubic feet daily. Domestic demand was up 11% (around 2,900 million cubic feet daily) and export demand rose 13% (2,800 million cubic feet daily).

- Capital outlays by the producing end of the oil and gas industry is estimated to rise to around 760,000 b/d. This reflects refinery expansions in Eastern Canada, particularly in the Maritimes and increased U.S. export demand for Cana-

da.

It is a foregone conclusion that the government will press for most ownership to be held by Canadians. It will also want as much of the financing that can be handled, without impairing the Canadian money markets, to be provided from Canadian sources.

There is little doubt that there are adequate gas reserves already in the combined Prudhoe Bay and Mackenzie Delta areas to supply a line that would move 1,500 million to 2,000 million cubic feet daily. But the Alaskan gas might still be tied up by the prolonged environmental negotiations that have so far blocked the building of the Alaskan oil pipeline.

The industry hopes sufficient reserves will be proved up in the Delta by the end of this winter's drilling season to support the vast pipeline undertaking on the basis of Canadian gas reserves alone. There are unofficial estimates that the necessary 12 trillion-15 trillion cubic feet threshold reserves have already been found.

The other possible eventual gas line to transport gas reserves from the Arctic Islands to Canadian and U.S. markets is in a very preliminary study stage. Various methods of moving the gas are being studied including pipeline or moving it by super air transport. The most likely route of a pipeline would be down the eastern string of Arctic islands, east of Hudson Bay and into eastern Quebec and Ontario and from here into the U.S.

Demand from the U.S.

The increasingly tight refinery situation in many parts of the U.S. and the lack of deep-water port facilities along the U.S. East Coast are sparking two major developments:

- Steadily rising demand in the eastern U.S. for Canadian refined products, particularly fuel oils.
- Increasing interest on the part of U.S. oil importers and refiners in the establishment of refineries in the Canadian Maritimes.

Already a substantial export demand has built up in the U.S. for East Coast refiners. Product shipments from two refineries are running around 100,000 barrels per day.

Gulf Oil Canada Ltd. is operating its Port Hawkesbury, N.S., refinery for half the week on product demands of its part.

The Quebec City refinery of Golden Eagle Canada Ltd. is shipping substantial quantities of heavy fuel oils to U.S. and Canadian markets.

Newfoundland Refining Co.'s new Come-By-Chance refinery, which comes on stream next year, will be shipping the major part of its product output to the U.S. East Coast.

The recent announcement of plans to build a \$223-million refinery and deep-water terminal in the Strait of Canso is based on the same economic considerations. Shabeen Natural Resources Co., New York — the sponsor behind the Newfoundland Refining Co.'s project — will build, own and operate a 200,000-barrels-a-day refinery equipped with capacity to produce large volumes of low sulphur fuels (FP, Nov. 18).

Such ports provide the economic benefits of lower transportation costs for moving foreign crude by supertanker. Part of this crude may then be transshipped by smaller vessels to refineries in the U.S. But since there is no major refinery expansion in sight in the U.S., most additional petroleum imports will have to be in the form of products.

And because these imported products will have to meet the rigid new U.S. environmental requirements, the refiner suppliers will have to upgrade their products.

The stringent clean air standards in 30 U.S. states limit sulphur content of fuels to 1% or less. The standards are not nearly as limiting at present even in the urban regions of Canada, although the regulations are steadily getting tougher.

An added environmental burden on the refiners is coming from the scheduled controls on auto exhaust emissions. Although emission control equipment has been added to new cars each year since 1970, the big impact of clean air rules will begin in 1975 with scheduled reduction of lead additives in gasoline and strict limits on pollutants.

Canadian refiners are already planning in this direction and latest refinery projects in the Edmonton complex of both Gulf and Imperial Oil Ltd. — have installed special processing units to compensate for gradual phasing out of lead.

dian refined products along the U.S. East Coast.

Canadian consumption of refined products has risen by 6% reflecting the gradual improvement in the economy. Refinery production, however, has risen more than 16% this year. Plants in Eastern Canada, charging imported feedstocks, have accounted for most of the extra growth.

Natural gas production continues to show hefty annual gains with an increase of 11% to an estimated 7,600 million cubic feet daily. Domestic demand was up 11% (around 2,900 million cubic feet daily) and export demand rose 13% (2,800 million cubic feet daily).

Capital outlays by the producing end of the oil and gas industry is estimated to rise to around \$125 million this year to a new record high of \$175 million. This reflects a further rise in exploration outlays including a pickup in drilling activity.

Report on Oil & Gas

Companies mentioned in this issue:

Amoco Can ... O-2	B	ERAP	O-4	Petrofina	O-4	Pan Ocean	O-2
Alt Nat Gas ... O-2	B	Eif Oil	O-1	Phillips Pet	O-1	Paragon	O-2
Aquafuels ... O-2	B	Francisco	O-2	Ranger Oil	O-2	Paragon	O-2
Assenters ... O-2	B	Gulf Can ... O-1	O-1	Sun Oil	O-6	Paragon	O-2
Autogas ... O-2	B	Golden Eagle	O-1	Shell Can O-1	O-1	Paragon	O-2
Asland Oil ... O-1	B	Globe Can ... O-1	O-1	Stande Can	O-2	Paragon	O-2
Bow Valley ... O-1	O-1	Globe Marine	O-1	Stand Off Ind	O-2	Paragon	O-2
British Pet ... O-2	B	Globe Pet	O-1	Stand Off Ind	O-2	Paragon	O-2
Bronco ... O-1	B	Globe Pet	O-1	Sundridge	O-2	Paragon	O-2
Bankeno ... O-1	B	Horn River	O-1	Siebens	O-4	Paragon	O-2
Can S Petrol ... O-1	B	Horn River Red G	O-1	Sinclair	O-2	Paragon	O-2
CGR ... O-1	B	Hudson Bay M&G	O-2	Sixty Rainbow	O-2	Paragon	O-2
Can Utilities ... O-2	B	Irvine Oil	O-2	Sigmar Oil	O-2	Paragon	O-2
Can W Nat Gas ... O-2	B	Interprov Pipe	O-2	Sinclair Nat Res O-2	O-2	Paragon	O-2
Can Arctic Gas ... O-3	B	Kenting	O-2	Trans Min Oil	O-2	Paragon	O-2
Can Superpet ... O-4	B	Kingsgate	O-2	Texaco	O-2	Paragon	O-2
Can Nat Gas ... O-2	B	Lambert Kuma	O-1	Trans East	O-2	Paragon	O-2
Can Northwest ... O-1	B	Mobil Oil	O-1	Tricentrol	O-2	Paragon	O-2
Coleman Controls ... O-1	B	Monte C Gas	O-2	Union Gas	O-4	Paragon	O-2
Conoco ... O-2	B	North Can	O-2	Unocal	O-2	Paragon	O-2
Chevron Stand ... O-2	B	Northwest Lands	O-2	United Cana	O-2	Paragon	O-2
Cigno Service ... O-2	B	Nord Refining	O-1	Voyager	O-2	Paragon	O-2
Chieftain Dev ... O-2	B	Pacific Gas	O-2	Westerco Trans	O-2	Paragon	O-2
Dome Pet ... O-1	B	Pan Can Pet	O-1	Westcoast Trans	O-2	Paragon	O-2
Drillitec Ven ... O-1	B	Pan Can Pet	O-1	Wescoil	O-2	Paragon	O-2
Demines ... O-1	B	Panarctic	O-1	Westburne Pet	O-1	Paragon	O-2



Imperial Oil has built a \$3 million island in the Beaufort Sea in the Canadian Arctic. It may be used as a drilling site if it is able to withstand the pressure of winter ice.

Record year for oil stocks with 50 wells by summer

(Continued from p. O-1)

highly critical in confirming major Arctic gas reserves. The first well is 20 miles west of Panarctic's previous gas strike. Although most of the structure is onshore, a strike would have an effect on Locheil Exploration Ltd. as well as Panarctic's 20 share-holders.

Deminelex (Canada) Ltd. — a consortium of West German companies — will drill a well on south-central Banks Island.

Gulf will drill a commitment well on the small Eglinton Island. A success on this acreage would affect Bankeno, Alminex Ltd., Cigol and Panarctic.

Eif Oil, owned 75% by the French government, 15% by Brascan Ltd. and 10% by Cigol, is expected to drill a well on Prince Patrick Island. This is near acreage held by Canada Southern Petroleum Ltd., BP Canada, Cominco Ltd. and Bankseno.

Other companies shares attracting North Sea interest include Home Oil Co., Cigol, Canada Northwest Lands Ltd., Pan Ocean Oil Corp., Seury Rainbow Oil Ltd.

United Canoso holds a 20% interest in the Signal Oil & Gas Ltd. oil discovery northeast of the Shetland Islands and some 25 miles north of the Shell-Essco Brent field.

Tricentrol Oils Ltd. also has a 10% interest. Further exploration and testing will be carried out to gauge the commercial importance of this most northerly discovery in the sea.

Bow Valley Industries and Sunningdale

Oil have interests in the discovery reported in the Norwegian sector of the sea. Pan Ocean is the operator. Investors are eagerly awaiting additional information on the importance of the find.

British Petroleum Ltd. has exercised an option to drill on the northern half of a Chieftain block southwest of the Forties field. A rig is expected to be moved into the block before the end of the year.

Ranger, Home Oil, Siebens, Numac, and Cigol are among the list of Canadian firms holding interests close to important finds. All are planning drilling programs as quickly as rigs can be made available.

How our oil flows

Total Canadian output and disposition of liquid hydrocarbons, including crude oil and equivalent, propane and butane

	Barrels per day	Change %
Canadian liquid hydrocarbons production	1,816,500	+13
Northwest Territories	2,700	+5
British Columbia	71,000	+42,423
Alberta	1,487,000	+243,033
Saskatchewan	239,000	-3
Manitoba	14,000	-4
Eastern Canada	2,500	-6
Total	1,816,500	+13
Exports to U.S.	818,700	+6
—West coast	285,000	+26
—Montana	85,000	+12
—Midwest	49,000	+23
—Eastern states	130,000	+3
Exports to Offshore	8,000	+6
Total exports	997,800	+13
Total demand for Canadian oil	1,816,500	+13

(+) Estimated.
Sources: Canadian Petroleum Association.

Pollution effects target in new study

Report on Oil & Gas

An Alberta cooperative society may be setting a new pattern on this continent for industry-sponsored environmental studies.

The organization, the Whitecourt Environmental Study Group, was formed this March by natural gas plant operators in the area of Whitecourt, about 110 miles northwest of Edmonton.

Its objective is to obtain accurate information about the short-term and long-term effects on the environment of sour gas plant operations.

Particular attention is being paid to effects of sulphur dioxide emissions.

Unlike most voluntary corporate environmental studies, this five-year research project is designed to chart all major ecological

cycles in an area which takes in 4,800 square miles.

The tools of the environmental consultant commissioned by the group include the classical butterfly nets

and sampling jars.

ERA Instruments' fleet of three aircraft bristles with probes, mirrors and a variety of sensors. Inside their usages is a maze of electronic and recording equipment, some of which stretches the frontier of today's remote sensing technology.

"Nature is never in balance. It is always dynamic, constantly shifting in reaction to a multitude of influences. We think in terms of 'zones of stability' or the boundaries within which an area can remain in sound ecological health."

"False color" infrared photography, born in World War II, has been greatly refined in the interim. Then it was used by insurance companies to detect early signs of damage to Florida citrus crops. Intensively developed since then, especially by the U.S. military, it is still a relatively new tool for environmentalists.

In the Whitecourt area, this technique reveals trees and vegetation under stress or being adversely affected, when nothing can be seen by the naked eye or by conventional photography.

"However, what really matters is what effect — if any — emissions are having on the environment.

"In some areas, for example, soils may be sulphur-deficient and actually benefit from the addition of SO₂. In others, industrial emissions well within regulatory allowances might cause serious damage."

"The Canadian Arctic geographer Dr. Kenneth Hare has often noted that the environment is not a respecter of boundaries, land leases or regulations. Our objective is to obtain an ecological profile of an area measuring 120 by 140 miles."

"We believe that industry environmental control programs as well as government regulations should bear a direct relationship to the good health of a specific environment. If this is to happen, we need more basic data than we now have."

Consultant to the Whitecourt Environmental Study Group is Dr. R. M. Holmes, president of Calgary-based ERA Instruments, Ltd. A native of Alberta, Holmes was an environmental research

specialist with the federal government for 15 years. For the last six years, his firm has conducted environmental studies for both government and industry.

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"We can't foresee the financial implications," said Ed Baranuk.

"The study's findings could conceivably lead us to spend either much more or much less on environmental control equipment at gas plants than we now think we will. However, we can expect three solid benefits.

"First, we will be able to engineer better plant emission control devices to meet the specific environmental needs of this area, he said. And the knowledge gained

will benefit other industries and governments. Thirdly, Baranuk added, our future environmental control programs will have a direct relationship to the ecological health of the Whitecourt area, rather than merely satisfying an arbitrary set of emission control standards.

"We also have reason to expect that the results of this study and similar data will form the basis for realistic environmental control laws and regulations by government," Baranuk said.

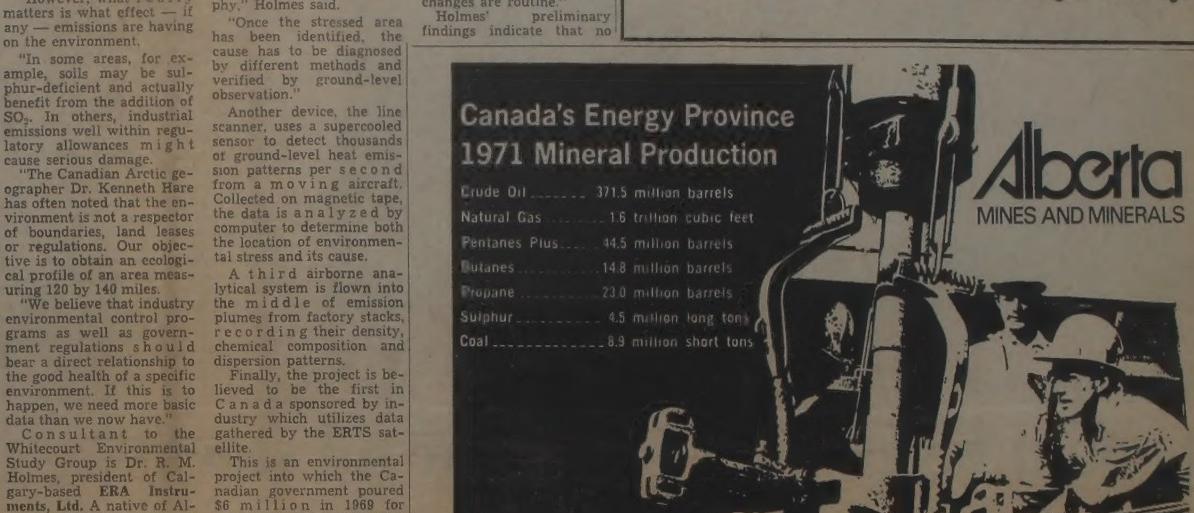
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Dilemma over proposed pipeline

Natural gas: crucial decisions ahead for Canada

By John Saganich

Starting with the historic pipeline debate back in 1956, Canadian natural gas has almost always been in the centre of some major controversy.

Corporate and public library files bulge with the record of these recurrent confrontations.

But that early pipeline debate that helped topple a government and all the later hassles are going to pale into insignificance before the national upset threatened by the latest collision — a proposed gas pipeline from the Mackenzie Delta in the Northwest Territories.

The bid to build the world's most ambitious pipeline project is coinciding with a strong wave of nationalist fervor and extreme concern for the environment. The financing of such an undertaking could seriously distort the money markets and put upward pressure on the C\$.

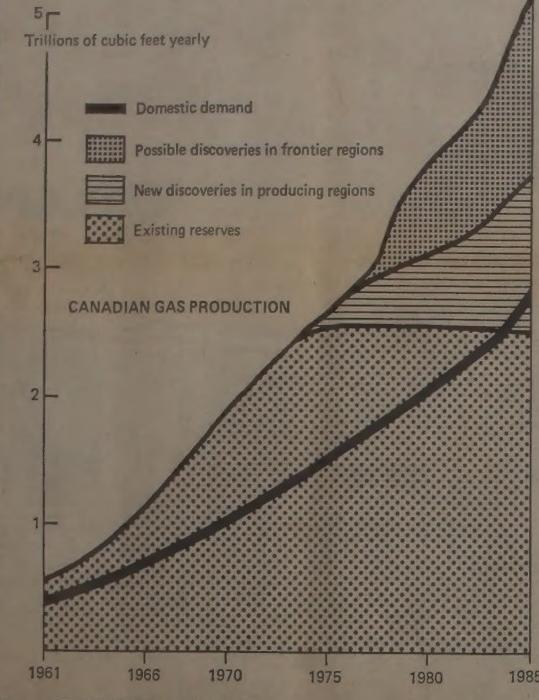
The debate will rage loud and long.

The outcome will seriously affect the future growth potential of the Canadian natural gas industry, oil and gas exploration development in the Arctic and the entire North American energy pattern.

And while the pipeline issue makes the headlines an even more bitter, less publicized confrontation is taking place on the gas front. Following lengthy hearings this spring and summer, sponsored by the Alberta government, the Alberta Energy Resources Conservation Board has claimed that the wellhead price of gas is 10c-20c per 1,000 cubic feet (mcf) below its market value. It thus implied that the current average field price of 16c per mcf should be doubled.

While major gas transmission companies and eastern gas utilities agree the wellhead price is in need of some modest upward adjustment, they stoutly oppose the sharp increases being recommended by both the Alberta Energy Board and petroleum associations.

What the gas supply/demand picture may become



Source: R.F. Winfield, Shell Canada Ltd.

1975 will be 35% short of supplying its natural gas requirements and 65% short by 1985.

Gas is becoming an increasingly popular energy source, partly because of its nonpolluting quality. This is making it a preferred fuel for the hydro generating plant market.

The inevitability of higher prices will spur exploration, including that in areas up to now considered marginal either because of expensive drilling costs or limited potential reserves.

This year will be a record one for Canadian natural gas producers. Net production (after allowing for wastage, flaring and gas reinjections) is estimated at more than 7,600 million cubic feet per day (mm cf/d), an increase of 11.5% over that produced in 1971.

Estimated domestic sales are placed at more than 3,000 mm cf/d, a rise of 9% over 1971 — with increases in three categories — residential, industrial and commercial. Other uses, over and above those distributed through utilities to the three markets, will raise domestic consumption to nearly 4,000 more cf/d, up more than 11% over last year.

Exports for 1972 are estimated at more than 2,800 mm cf/d, an improvement of 13% over the previous year. This represents a decline from the 17% rise in 1971 over that of 1970 and the average export growth rate of nearly 16% in the 1966-1970 period.

This reduced growth rate is regarded as the termination of the period of rapid growth in export sales until such time as sufficient new gas reserves are brought into the distribution system.

Only a slight rise is seen for gas exports next year in the absence of any additional gas export approvals. However, sales in Canada are expected to show another healthy rise. A slight increase in imports to meet Canadian demand is expected.

Drilling activity — both

exploration and development — is heavy.

Development drilling has been extensive, particularly in Alberta, on renewed efforts to find additional reserves to meet burgeoning demands.

Exploration drilling also is going on at an accelerated pace. Much of this is concentrated in the various frontier and offshore regions, except those of Hudson Bay and the West Coast. Large commercial reserves have been located both in the Mackenzie Delta and the Arctic Islands.

Two statistics point out the importance of gas: in

1920 it supplied just over 4% of the North American energy market. In 1970, its contribution rose to almost

32%.

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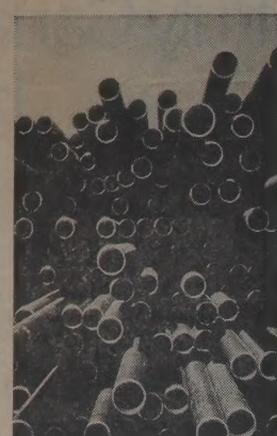
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What the most active exploration firms are doing

Canadian Superior

Productions: Oil 34,626 b/d
Gas 136 mmcf/d
Reserves: Not published

gian Sea. These applications were made on the basis of existing seismic work and are about 100 miles from offshore oil production in Tunisia.

North Canadian has a 50% interest in permits to explore for salt for cavern use on Cape Breton. The caverns could be used for the storage of liquid natural gas.

Seismic exploration and exploratory drilling continue on the Scotian Shelf and in the southern U.S. Twelve gas wells have been completed off the coast of Louisiana and a 13th is being drilled. The company has a 5% interest in that area. In another block, where the company has a 5.6% interest, five exploratory wells have been drilled and the prospects of wet gas production are good. Exploration is continuing in the Mediterranean and off the coast of Indonesia.

Sunningdale

Productions: Oil 173 b/d
Reserves: Oil 1,551,000 bbl
Gas 2,015 mmcf

Sunningdale Oils Ltd. is engaged in a re-work operation of its Pembina Project properties and has acquired substantial new acreage in gas-prone areas of Alberta in partnership with others.

Sunningdale is proceeding with anticipated drilling and geophysical work in the North Sea. Norway has announced that a wildcat well on a block in which the company has an interest discovered quantities of natural gas and oil. Considerable activity will be directed to this block and at least one well will be drilled in the British sector.

The company is active in the Adriatic and off the coast of Sicily. It has acquired an interest in a concession off the Tunisian coast.

Sunningdale has acquired an exploration permit in Western Australia and is investigating exposure in the mining field in that area. The company now has interest in 800,000 acres off the coast of Abu Dhabi.

North Canadian

Productions: Oil 130 b/d
Gas 35 mmcf/d
Reserves: Oil 387,000 bbl
Gas 388,000 mmcf

North Canadian Oils Ltd. has a 22.5% interest in a well to commence immediately to evaluate 14,000 acres at Nose Creek, Alta. After recovery from production of its proportionate share of all well costs, it will have an 11% interest in the entire block covering 47,000 acres. It will also participate in a 12,000 foot exploratory well in north-eastern British Columbia.

North Canadian is conducting a joint seismic program on the Peace River arch in Alberta, where it already owns an interest in undeveloped lands.

The company, with three other companies, has applied for concessions covering about 200,000 acres in the Italian part of the Pela-

on Axel Heiberg Island was started in October on a site 35 miles southwest of the Panarctic Romulus C-42.

The company plans to conduct exploration in the North Sea. In conjunction with other partners, it has applied for four concessions from the Dutch government.

In 1973, exploration in Western Canada will remain at the same level as in 1972. The company is planning to drill at least one well in the extreme southern portion of the Mackenzie River Delta.

Acres acquisition in the Arctic Islands, the East Coast and the North Sea will continue but drilling plans for these areas have not yet been developed.

Asameria

Productions: Oil 17,000 b/d
Reserves: Not published

In 1973, Asameria Oil Co. plans to drill 14 exploratory wells in North Sumatra.

Chieftain

Productions: Oil 100,000 bbl
Gas 75,000 mmcf

Chieftain Development Co. is one of the most widely represented independents in the North Sea play. Its interests cover 1.15 million acres (453,000 net) in Britain and German sectors of the sea and the British portion of the Celtic Sea.

It also has nonexclusive exploration rights in the Irish Republic's unallocated offshore territory, and has applications pending or planned for Norwegian and Dutch licenses in the North Sea.

Most interesting are the company's holdings near the Forties field in British sector of the sea. British Petroleum Co. has elected to drill on the north half of company's block 21/14 to earn a 50% interest. It's Sea Quest rig is currently drilling on the BP 20/10 block which is about 12 miles west of Chieftain's block 21/17. The rig is expected to be moved to the 21/14 block before year end.

Some of the company's North Sea exposure is provided by its 11.4% share interest in Sea Search Ltd., a London company with a 23% stake in the multi-company Sea Search Group. The group was awarded four blocks in British sector in this year's awards and has commitments to drill four wells.

Hudson's Bay Oil

Productions: Oil 70,624 b/d
Gas 340 mmcf/d
Reserves: Oil 364,224,000 bbl
Gas 2,874,000 mmcf

Hudson's Bay Oil & Gas Co. has discovered natural gas in five of six exploratory tests in west-central Alberta where it has considerable acreage. Oil has also been discovered in Wyoming and Utah, where exploration is planned for gas prospects.

Exploration is continuing in Yorkshire, England, with one well planned for 1973. Home was awarded two exploration blocks in the British portion of the North Sea. Its interest in these blocks is 30%. A detailed seismic program is being interpreted. Other seismic data on acreage off the shores of Norway and Ireland is being interpreted.

Home also has interests in the Mediterranean and in the Somaliland Republic. A deep exploratory test

will resume drilling of the Fort McPherson well in the Northwest Territories and start two new northern exploratory tests in the Mackenzie River Delta. Drilling will start as soon as weather conditions permit on a well 65 miles south of Grand Prairie, Alta. Access studies have been completed for a drilling program in late 1973 to the west of the Mackenzie River Delta.

In the 10 months to Oct. 31, Canadian Industrial Gas & Oil Ltd. completed the drilling of seven oil wells and one gas well in Western Canada.

It will participate in the drilling of a well on the west coast of the Sabine Peninsula on Melville Island. Two wells were completed at Drake Point and are prolific gas producers.

The interest in these wells is 2.1%. The company also has a 0.67% interest in Panarctic Oils Ltd.

In the Mackenzie Delta region, the company has undertaken to drill six exploratory test wells on land farmed in from Imperial Oil Ltd. Upon completion of the drilling, the company will have earned a 25% interest in 156,000 acres.

The company has a 10% interest in Elf Oil Exploration & Production (Canada) Ltd. interests in 200,000 gross acres in the North Sea, 38% interest in 3.5 million acres in Tunisia, and interest in two exploration permits in the Adriatic Sea.

Panarctic Oils Ltd. has announced the location of a well 11 miles southwest of Panarctic Romulus C-42, in which Francana Oil & Gas Ltd. has a 15% net working interest. Panarctic has completed 90 miles of a seismic program on Francana's permits in the Fosheim Peninsula.

Francana has participated in the drilling of six wells; one was completed as an oil

Total

Productions: Oil 5,193 b/d
Gas 17,700 mmcf/d
Reserves: (1971) Oil 36,447,800 bbl
Gas 164,573 mmcf

producer in Saskatchewan and another was completed as a potential gas well in Alberta. The other wells were dry.

Through its 22% equity position in Trend Exploration Ltd., Francana is participating in a six-month drilling program in West Iran. Trend will drill an exploratory well in the Cheshire Basin in England. Trend abandoned drilling of a well in the British portion of the North Sea. Further drilling is contingent on the results of wells to be drilled on adjoining blocks by other operators.

Voyager

Productions: Oil 75 b/d
Gas 28 mmcf/d
Reserves: Oil 220,000 mmcf

Voyager Petroleum Ltd. will be continuing an active seismic exploration program and will be participating in the drilling of some 25 to 30 wells in the western provinces over the next few months. The company is represented in the North Sea with a 5.5% share interest in Sea Search Ltd., a British company with wide acreage representation in the area. Voyager owns a 16.3% interest, evaluated.

Union Oil Co. of Canada will resume drilling of the Fort McPherson well in the Northwest Territories and start two new northern exploratory tests in the Mackenzie River Delta. Drilling will start as soon as weather conditions permit on a well 65 miles south of Grand Prairie, Alta. Access studies have been completed for a drilling program in late 1973 to the west of the Mackenzie River Delta.

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Texaco

Productions: Oil 16,350 b/d
Gas Not published

Texaco Canada Ltd. does not publish information on its exploration program.

Union of Canada

Productions: Oil 33,638 b/d
Gas 47,713 mmcf
Reserves: (1971) Oil 147,378 bbl
Gas 310,083 mmcf

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Cigol

Productions: Oil 11,000 b/d
Gas 95 mmcf/d
Reserves: (1971) Oil 49,723,000 bbl
Gas 419,000 mmcf

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Home

Productions: Oil 34,218 b/d
Gas 684,400 mmcf
Reserves: Oil 141,000,000 bbl
Gas 2,977,000 mmcf

Home Oil Co. has increased its net acreage to 5.1 million acres from 4.6 million during the first three quarters of this year. The company is farming out its Alberta acreage for exploration, and computer analysis of an evaluation of its tar sands holdings is in the final stages. Seismic tests are being conducted in other Canadian sites.

In the U.S., Home has a 12.5% interest in the south where four wells are to be drilled this year and four more next year. Varying interests in 254,823 gross acres have been acquired in Wyoming and Utah, where exploration is planned for gas prospects.

Exploration is continuing in Yorkshire, England, with one well planned for 1973. Home was awarded two exploration blocks in the British portion of the North Sea. Its interest in these blocks is 30%. A detailed seismic program is being interpreted. Other seismic data on acreage off the shores of Norway and Ireland is being interpreted.

Home also has interests in the Mediterranean and in the Somaliland Republic. A deep exploratory test

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producer in Saskatchewan and another was completed as a potential gas well in Alberta. The other wells were dry.

Final documentation on exploration licences in Kenya and Italy are being processed.

Western Decatla

Productions: Oil 5,925 b/d
Gas 18,700 mmcf/d
Reserves: (1971) Oil 25,822,000 bbl
Gas 285,300 mmcf
*Proven on probable

under review in view of formulating drilling plans for 1973.

Final documentation on exploration licences in Kenya and Italy are being processed.

and its associate, Amoco Canada Petroleum Co., currently have two semi-submersible drill rigs in operation.

Hydrocarbon shows have been encountered at two widely separated locations — Heron H-73, about 250 miles south of St. John's, Nfld., and Cormorant A-93,

about 200 miles east south-east of St. John's.

Bow Valley is participating in the drilling of a well in the North Sea which has been announced by the Norwegian government as a combined gas and oil discovery. The company

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continuation of its

Integrated oil firms lead the way in attempt to avert energy crisis

By Frank M. Sands

U.S. integrated oil companies will be in the forefront of the changes that will have to take place in order to avert the impending energy gap.

Over the coming decade, these firms will continue to provide the lion's share of U.S. energy.

The end results needed in this vital part of the economy are simple and clear-cut:

- The discovery and development of big oil and gas reserves in politically secure areas.

- Substantially higher investment in new refining and marketing capacity.

- The creation of supple-

This comment on the U.S. investment scene is prepared by staff members of David L. Hodson & Co., Boston investment counselors. The series covers important trends in specific U.S. industries, various aspects of U.S. securities market developments and the general business situation.

mental forms of energy at economically viable costs.

Finding the means of accomplishing these objectives is what the so-called "energy crisis" is all about. Some of the strain will be alleviated as fuel prices are forced upwards from their bargain levels of the past, and the leading petroleum companies have the size and expertise to innovate effectively.

But their progress will be severely hampered unless they can operate within the framework of a new energy program coordinated at the national level.

This whole field has become bogged down in a morass of outmoded and con-

How the big 15 fare

	Earnings per share			1967-72	P/E ratio	1967-72	Recent yield %
	1972	1971	1970	growth rate	Recent	1967-72	1967-72
Amerada Hess Corp.	3.79	3.73	3.22	+11%	13	14	0.6
Atlantic Richfield Co.	3.23	3.73	3.68	-7%	19	20	3.2
Continental Oil Co.	3.11	2.73	2.66	+2%	11	13	4.4
Gulf Oil Corp.	2.50	2.70	2.65	-2%	9	10	6.5
Mobil Oil Corp.	2.60	2.96	2.83	+1%	12	14	5.2
Phillips Petroleum Co.	5.60	5.33	4.77	+7%	12	11	4.0
Royal Dutch Petrol. Co.	1.85	1.78	1.58	-5%	19	16	3.6
Shell Oil Co.	4.00	3.63	3.52	-3%	12	14	5.1
Standard Oil Co. of California	6.20	6.02	5.56	+4%	11	11	4.3
Standard Oil Co. of Indiana	5.30	4.95	4.55	+5%	14	13	3.2
Exxon Corp.	6.90	6.77	5.91	+4%	12	12	4.9
Standard Oil Co. of Ohio	3.00	3.23	3.55	-4%	26	20	3.4
Texaco Inc.	3.40	3.32	3.02	+3%	10	12	4.7
Union Oil Co. of Calif.	2.90	2.80	2.80	-4%	11	12	4.8
average	3.85	3.85	3.62	+1%	13	13	4.2
Standard & Poor's 500-stock industrial index	6.20	5.56	5.03	+3%	17	17	2.9

E-Estimated. *Formerly Standard Oil Co. of New Jersey.

eration by these nations in energy matters more difficult. Vastly oil companies remain a noble academic and political tradition. All of us play a self-destructive role in the energy drama.

"Yet to provide for oil needs alone in soaring world energy demand will require the companies to commit more than US\$500 million in new investment during the coming decade. But their modest yearly rates of return on investment (ranging from 8%–12%) simply do not permit them to generate such funds."

"Whether one likes oil companies or not, there is at the moment no workable substitute for them in sight. The energy-hungry world, as well as the producing governments, both need them desperately."

Demand and supply

Oil demand in the U.S. is expected to continue expanding at 4%–5% annually through the 1980s. Overseas growth should moderate from the 9% pace of the past decade as the economies in Europe and Japan become more service oriented. Nevertheless, worldwide oil consumption is projected to rise by around 7% per year.

This means that the non-communist world's current annual requirements of 16–400 million barrels will double to 33,000 million barrels by the early 1980s. At present, total proven reserves are 530,000 million barrels, of which 350,000 million or 66% are located in the Arab-bloc countries. For this reason, the U.S., Europe and Japan will increasingly have to rely upon production in this unstable region.

The exploration for new oil has been greatly reduced in countries where profit incentives have become almost nonexistent, such as Libya, Iraq and Venezuela. The companies are concen-

trating their search in the North Sea, Alaska and Canada, where undiscovered oil pools exist. Even if they turn out to be major finds, they will still be only a drop in the bucket compared with the 250,000 million barrels the noncommunist countries will consume in the next ten years.

Earnings growth

This worldwide oil business has literally hundreds of public and private concerns involved in its various drama.

The industry's overall progress can be gauged by the results of the 15 companies listed in the table. This group accounts for nearly three fifths of U.S. crude oil and natural gas production and half of worldwide oil output. In the early 1960s, the group's earnings per share increased, on average, by 8% annually. Over the past five years, however, the growth in earnings has been only 1% per year despite a 9% upturn in revenues. In the first half of 1972, the group's profits declined 6%.

The problems of recent years can be traced to a

combination of unsatisfactory product prices and rapidly escalating costs. In the U.S., gasoline prices have been inadequate because of competition from lower-cost independent operators. Overseas results have been hurt by chronically weak prices which have offset huge gains in volume.

The strongest impetus to earnings has come from oil and gas production. In the years ahead, declining U.S. output will have to be replaced by huge quantities of much less profitable imported crude. Some companies owning major new reserves in such areas as the North Slope, the Santa Barbara Channel or the Gulf of Mexico will be able to increase their domestic production, but most will not.

At the same time, tax payments will continue to balloon. In the U.S., the 1969 Tax Reform Act raised the industry's annual tax bill by US\$600 million. In 1971 alone, foreign taxes jumped US\$4,000 million to a total of US\$12,000 million. The major producing countries now take over 80% of the government/industry profit split. The situation is so far out of whack

November 25, 1972

The Financial Post Report on Oil & Gas

has doubled in the past decade.

Industry managements are responding to the difficult operating climate as profit-conscious business enterprises. Without cooperation, no company wants to expand its refining or marketing capacity when the opportunity of making a reasonable rate of return is lacking.

Some industry problems—such as gasoline marketing—are self-inflicted and must be remedied internally. But most stem from restrictive, confusing and up-in-the-air government policies in respect to exploration incentives, antipollution law and import controls. These must be resolved at the national level to enable the companies to plan sufficiently ahead to provide the nation's growing energy needs—75% of which are derived from oil and gas.

The 15 leading integrated companies listed in the table are financially strong and should be able to improve their earnings modestly in the years ahead. If the much-needed incentives are forthcoming, the outlook would be greatly enhanced, especially for those firms which can find significant new oil and gas reserves.

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How gas utilities are performing

Union Gas Ltd. earnings for the six months ended Sept. 30, 1972, were 16.3¢ per share, up 1.2¢ from same period a year ago. Total gas sales and other income were \$60,283,000, up 16.8%.

For the 12 month period ended Sept. 30, 1972, earnings were 80.2¢ per common share (\$0.10c).

The company is paying an extra 2.1¢ per thousand cubic feet for gas purchased from TransCanada PipeLines Ltd. and these payments are not charged to operating expenses but are being deferred until the Ontario Energy Board can decide, following a future hearing, the appropriate method and period of amortization.

Union Gas' bid to become a participant in Canadian Arctic Gas Study Ltd. has been accepted.

Northern & Central Gas Corp., Toronto, reports that a number of factors point to much improved earnings for the fourth quarter and the full year. They are favorable developments at subsidiary Coleman Collieries Ltd. Coleman, Alta., the start of liquefied natural gas (LNG) sales from the Montreal plant, the possibility of a favorable rate decision for subsidiary Gas Métropolitain Inc., Montreal; colder-than-normal weather in October and November; and the improved earnings trend at subsidiary Canadian Industrial Gas & Oil Ltd., Calgary.

Consolidated revenue in the first nine months of 1972 increased 12% to \$156.9 million. Consolidated net income, however, declined to \$9.8 million vs \$9.8 million in the similar period of 1971. This was equal to 53¢ per common share vs 55¢.

The three main utility operations contributed \$7.55 million to consolidated net income in the first nine months vs \$7.983 million a year ago. The third quarter was affected adversely by a continued weak market for coke from the Montreal plant and the abnormal weather pattern in Manitoba in September, 1972.

The utility divisions added 11,000 new customers during the first nine months.

Consumers' Gas Co. earnings for the year ended Sept. 30, 1972, were \$23.3 million, up 8% from a year ago. Common share earnings per share were \$1.28 for the latest year.

Gas sales revenue totaled \$197.4 million (\$158.3 million previous year). Num-

ber of active customers in all categories, residential, commercial and industrial, rose to 429,550 from 411,206 a year ago.

Gas sales increased from 179,000 million cubic feet in 1971 to 240,000 million cubic feet in 1972, or 34%.

The sales increase occurred in all categories of the business.

The company is reaching the point where general inflationary pressures and higher gas purchase costs will force application to the Ontario Energy Board for permission to pass on to its customers these costs which are beyond company control," the recent annual report stated.

The company now owns

Natural gas revenue was up 14% due to system growth and colder weather. Volume of gas sold was up 15% at 169,000 million cubic feet. At the end of September, 309,882 customers were being served, an increase of 14,387.

Electric revenue realized a gain of 10% to \$24,913,000.

During August, Canada's first experimental natural gas fuel cell power plant was installed by Canadian Western Natural Gas Co. in a Calgary show home. The field test is being made to determine if it is practical to develop fuel cells for commercial, industrial and residential power generation.

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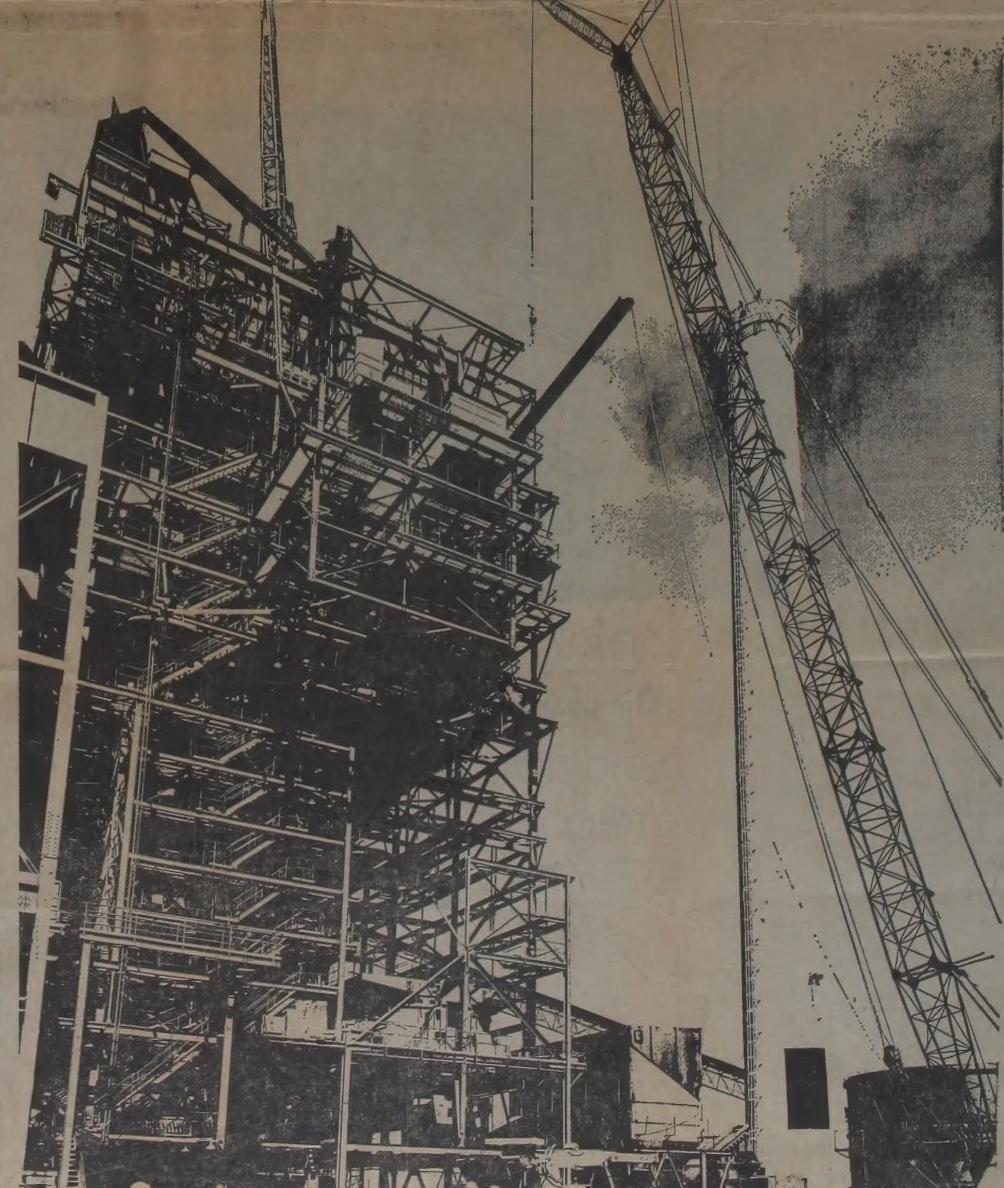
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Refineries' output jumps to match export fuel orders

By Hugh McIntyre

Both demand and production figures for refined petroleum products in 1972 are increasing strongly.

Demand rose 5% this year with an average increase of 94,300 barrels daily over first-half 1971 figures.

Refinery production increased even more: by 13%, according to Statistics Canada figures, up an average of 170,800 barrels daily to an average of 1,474,000.

Atlantic coast plants charging offshore crudes accounted for most of the increased activity. In that area, crude runs to stills were up 27% over first-half 1971. Refinery output in Ontario was down 4.5%. But British Columbia and the Prairies posted 5% and 10% increases respectively.

The trend was underlined by this month's announcement of Canada's largest yet refinery project, masterminded by New York industrialist John Shaeen at Port Musgrave in Nova Scotia's Canoe Strait (FP, Nov. 18).

Earlier project

Next year's output will be increased by production from Shaeen's earlier project, the 100,000 barrels-a-day (b/d) Come-By-Chance refinery in Newfoundland, expected to come on stream next spring.

As well, Gulf Canada Ltd. President Jerry McAfee has indicated that he wants to increase the flow of oil through the company's Port Tupper supertanker terminal, and that a doubling of the present 95,000 b/d refining operation is being considered.

Shortage of suitable refineries in the continental U.S. is strengthening the position of Canada's Atlantic coast provinces as a future processing centre for the whole North American east coast.

And the same antipollution regulations that inhibit new refinery siting in the U.S. have also opened a profitable market for low-sulphur fuel oil.

Product shipments to east coast U.S. ports have tripled this year, running 190,000 b/d from Port Hawkesbury, Irving Oil Co.'s Saint John refinery, and the Quebec City refinery of Golden Eagle Refining Co.

Most of these shipments are of heavy fuel oils, with some jet fuel. The Come-By-Chance product will include, if present marketing plans work out, considerable jet fuel shipped in bond for European air carriers flying from U.S. airports.

I am skeptical that this

work is going on at Edmonton on the 180,000 b/d Strathcona refinery, which will be the biggest in the West when completed.

At the Loco refinery in British Columbia, a new control centre and environmental control project valued at \$4.5 million is being built.

Pollution control

A \$32.2 million expansion of its Sarnia refinery was announced in September by Sun Oil Co., more than doubling capacity from 38,000 b/d to 80,000 b/d. Major units to be built include a new crude tower, naphtha pre-treater and reformer. Construction work - force will peak at 550.

The construction program of Shell Canada Ltd. illustrates how much of the refiner's investment today goes into environmental control facilities. Along with a \$10 million program to increase the Sarnia refinery's capacity to 70,000 b/d by year-end, Shell is spending \$2.5 million on air quality measures and \$2.7 million on waste water quality improvement. Included in the program are new 300-foot stacks to ensure dilution of sulphur dioxide content of waste gases and facilities for sour water collection and dilution.

Another aspect of environmental costs is the 10,000 b/d Hydrobon - Platformer unit being built at the Gulf Canada Ltd. Clarkson refinery near Toronto.

The new \$11-million unit will provide the refinery with sufficient high-octane blending material and blending flexibility needed to meet possible future demands for low-lead and no-lead gasolines.

Skeptical

Canadian Bechtel Ltd., contractor for the unit, expects it will be completed in May.

Although oil companies are readying themselves for further restrictions on lead compounds as a means to upgrade octane rating of motor fuels, the recent statement by the federal Environment Minister Jack David that the Clean Air Act would be amended to prevent sale of gasoline containing over 2.5 grams of lead per gallon after the end of 1973, has upset them.

I am skeptical that this

amount. "I would think most oil companies will be objecting to this proposal."

The amount of lead content is not the problem. In fact, it represents the average lead content of motor fuels produced by major refiners now. But cutoff at that maximum would make blending of premium motor fuel a problem, and probably lead to increased price

differentials for the product.

This could only intensify the present gas price war between stations affiliated with the major refiners and those belonging to independent gasoline suppliers (FP, Nov. 18).

So far, consumers have shown general indifference to low- and no-lead brands of motor fuel.

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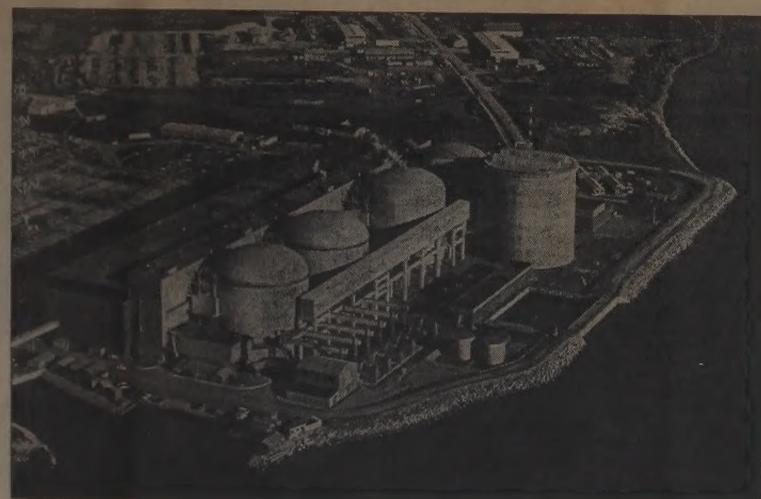
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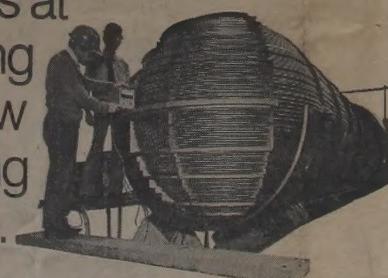


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Exploration costs may hit \$30 billion

By Horst Heise

Canada's three frontier exploration areas — the coast of the Arctic Ocean, the Arctic Islands, and off the eastern coast — have all reached a stage of fairly extensive exploration.

In the immediate years ahead, though, each area will probably see the oil industry's exploration efforts raised to a multiple of the current level.

At the moment, exploration dollars spent per annum are counted in the tens of millions for each area, and this initial investment curve is headed steeply upward.

Total oil industry expenditures for exploring and developing these three frontier

areas have been estimated to run as high as \$30 million for the next decade.

With a greater drilling rig count than last year, more boreholes will be drilled.

In each area, the drilling effort has been rather spotty since such large areas have to be drilled.

Both the geographic region under active exploration and the type of prospect singled out for drilling will be expanded during the years ahead.

The expansion of exploration territory will also include the spreading of efforts into different geological environments — for example, into the geologically older areas of the Arctic Islands and the geologically quite young Sverdrup Basin, which is the current exploration hot-spot in the Arctic Archipelago.

Meanwhile, drilling statistics appear to indicate at least an improvement of the exploration picture in the western provinces. Although there haven't been any very large or even any significant oil or gas discoveries there recently, the provinces are still in a fortunate position. More areas capable of producing have already been connected to pipelines, so additional connections would be relatively cheap.

More and more of the major holders of oil and gas rights are willing to grant farmouts to others, although on fairly tough terms.

Alberta has passed legislation that taxes oil reserves already discovered, but which also gives incentives to drill for additional reserves. This not only raises the taxes for every producer, but it also amounts to a Robin Hood attempt of taking it from the rich (essentially the majors) and giving it to the poor (the independents).

Although the incentives are available to every operator, only the independents have remained aggressive. The major firms throw most of their resources into the frontier battle for what they hope are very large reserves, leaving little money or personnel available for exploration.

The incentives could help

If handled with a minimum of administrative short-sightedness, these incentives could have a profound effect upon the Alberta exploration scene.

All oil or gas producing regions have to offer assured continuity of supply over very long terms to warrant the initial installation of pipelines and to allow for the expansion of their capacity.

There's no danger that increases in oil well capacity will be short-lived and not require an increase in pipeline capacity. Any slackening of production will be picked up by the seemingly inexhaustible Athabasca tar sands.

When drilling began, oil was the target in each of the three frontier areas. Today, only two to three years later, gas is the big thing in all three regions.

Not only has gas been the major find in all areas, in the Mackenzie Delta (at the moment at least) it is definitely the preferred commodity.

Large oil discoveries, and there may already be one on northern Richards Island, might focus public attention on the possibility of an oil pipeline through the Mackenzie Valley again. Imperial Oil Ltd. and the Gulf Oil Canada Ltd.-Mobil Oil Canada Ltd. team are very interested in a gas pipeline along the same route.

In Alaska, the Alaska oil line, planned from the Prudhoe Bay oil discovery on the Alaska North Slope, is still being stalled in the courts. Many opponents want the line to go through Canada (along the Mackenzie Valley route) instead of to the tidewater in tankers. All operators fear the possibility of further tie-ups on both sides of the border.

In the Arctic Islands, only noncommercial shows of oil have been found. But the three large gas finds, already known, are in the commercial class. Now the only worry is whether enough discoveries can be made to reach a fairly high volume threshold reserve for the first pipeline into the region. The discovery of more is a foregone conclusion, and it's reasonable to hope for.

On the east coast, Mobil Oil-Texas Eastern Transmission Corp. team has two good gas-condensate finds. Oil is also present in substantial quantities in one of them. If further developmental drilling on these two structures proves successful, the team might already have enough reserves of natural gas to warrant application for a pipeline to the mainland. Further drilling on Shell's Primrose structure might also be significant.

The important first step for any new exploration region is to reach "threshold" volumes of reserves — a big-enough, certain supply of oil or gas to justify the building of a pipeline into the area.

This has never been more true than in the very remote frontier regions of the north. But it is equally important for even a relatively "close-in" area like offshore Nova Scotia, which lies closer to markets

than any other active Canadian exploration region except Quebec, where the potential is unknown.

Later an indicated oil well was abandoned at Atikak, near Mayoigak, when some drilling mud problems prevented proper testing of the hole. Thus Imperial has made one single zone, one dual zone, one and one possible oil discovery on Tuk Peninsula.

As part of this initial oil success on Tuk peninsula, the next and third significant Arctic discovery on the North American mainland was the discovery of gas at Taglu, smack in the centre of the Mackenzie Delta on Richard's Island.

It is probably one of the biggest gas discoveries ever made on this continent. This well started a headlong rush into Delta activity, foreseen by Imperial itself. Before this activity stopped at sustained exploration.

Imperial found one more, seemingly very big, gas field with its Mallik L-38 north of Taglu, which was abandoned due to mechanical difficulties in the hole because of high pressures encountered in the productive formations in this area.

A later, separate find southeast from L-38, Mallik A-06, was abandoned for geological reasons, indicating the strict evaluation Imperial maintains in this high-cost area.

In fact, Imperial has announced that this well, which was later abandoned, showed indicated hydrocarbon zones. Presumably these were not good enough to follow up at this time.

The fourth significant strike was the Ivil oil discovery at the northern tip of Richard's Island and the Delta. It promises to be an excellent find, and will see development drilling this winter.

Temperatures occur at temperatures ranging from about 10 trillion cubic feet, but for a large diameter pipeline (36 inches or larger). With this proposal it is pointed out that the pipeline distance to the nearest market is about 1,000 miles, and that federal authorities have, in the past, demanded that foreseeable reserve requirements of domestic customers be protected by accordingly large reserves.

But then the offshore play requires investments much larger than have previously been required for domestic land-based exploration in the western provinces.

These investments should, it is being pointed out, be satisfied by allowing sales at a rather early stage of development of reserves, which can only be done if the domestic future requirement provisions are being kept in a proper profitable balance with export volumes.

If only liquefaction were to be considered at a place like Sable Island, as little as two trillion cubic feet of reserves might already allow production. Reserves discovered so far still need more delineation, but both the Mobil-Texaco Eastern team's discoveries at Sable Island and at nearby Thebaud look highly promising as possible economic producers.

Shell's Primrose structure still remains a question mark.

The Mackenzie Delta region at the coast of the Beaufort Sea in the northwesternmost corner of the Canadian mainland is the hottest exploration area on this continent today.

Already Imperial Oil Ltd. (current main land holder and main operator in the region) has obtained the highest wellhead price for natural gas in Canada for reserves of this 10 trillion cubic feet — discovery. It has contracted to two U.S. pipeline companies for about \$4,000 million over the length of the contract.

Already at threshold

The company has obtained a line of credit for development drilling of gas reserves from the same future customers of \$200 million each year for four years plus \$200 million after exports have been arranged — all against gas reserves to be produced.

Imperial is thought to have discovered already the threshold volume of 15 tcf needed to justify building a 48-inch pipeline to southern markets. Gulf and Mobil have also brought in one strike southeast of the Delta at Parsons Lake (reportedly a rich find).

All gas finds have also reported condensate with the gas. Thus the possibility of an oil pipeline from the Delta region is quite real, given large-scale gas production and the presence of one big oil find on Richards Island, plus three more oil discoveries on Tuk Peninsula. There, Imperial has started to give farms; the first one went to Canadian Industrial Gas & Oil Ltd., on which Imperial's own rig will start a drilling program this winter.

In jeopardy

Very large permit holdings are held offshore by a great many companies, some of which are still trying to increase their holdings — for example, Sun Oil's recent acquisition of certain 25% to 75% interest holdings in 1.2 million acres from Scurry Rainbow for a rumored cash consideration of between \$3 million and \$4 million — falls into this trend.

Offshore drilling will have to take place sooner or later since all permits carry commitments and since farmout obligations already exist, for instance for the Texan oil interests which are obligated to drill an offshore well on a farmout from Dome Petroleum Ltd. Trouble is that, although four proposals for types of offshore drilling operations have been designed, the government does not at all seem ready to grant permission to the two systems which have been proposed, one by Lamar Hunt and the Texas interests. And the other by a group of nine companies organized in a task force.

The refusal to grant Hunt a license to drill (it would take about two years from the granting of approval to building and transport of a system to the drill site) has placed the whole deal between Hunt and Dome in jeopardy because Hunt cannot fulfill his obligations to Dome. Dome thus cannot have the work done it wants, but eventually must do what any other permit holder in the area does.

The task force group consists of companies with parcels of cash bonus commitments which are due to start on Jan. 30, 1973, at the latest.

The nine companies are Canadian Superior Oil Ltd.; Union Oil Co. of Canada; Hudson's Bay Oil & Gas Ltd.; Gulf Oil Canada Ltd.;

Thiokol at the root of the peninsula, southwest from Atkinson Point.

Aquitaine Co. of Canada; Amoco Canada; Elf Oil; Texaco Exploration and Mobil Canada.

Six units

Each drilling system for the Beaufort Sea will cost \$20 million and up. An important aspect of any proposal is to have enough participants together to support such an expenditure since it would hardly pay to move such an expensive drilling system for just one or two or even three seasons at a cost of about \$15 million per short season.

Imperial has taken the first step to drilling the shallow offshore with the building of the first artificial drilling island — now standing the test of winter. Two more platforms will be built next year so drilling can start by next winter after the sea ice is frozen. It is expected that other firms — possibly Chevron and Bow Valley — will also begin to build these exploratory "platforms."

In the Delta region, 14 rigs are now stationed over an east-west distance of about 25 miles and a north-south depth of 100 miles. The area reaches from Eastern Tuk Peninsula in the east to the Yukon coast in the west and from Hooper Island in the Delta to south of Akavik.

In fact, Imperial owns or has under contract six units. One is on Tuk Peninsula where it will follow up the indicated oil discovery at Atikak. On Richards Island are four rigs and on Hooper Island one. Shell has two rigs working, Chevron has one rig stacked beside one of the Shell holes and pays "bottom hole" money into Shell's test. Union Oil has one south of Akivik. Gulf operates three — two for itself and Mobil and one for the old Gulf-Imperial-Shell team on pooled acreage. Pacific Petroleum will drill one test off Roland Bay, just south of Herschell Island, on the Yukon coast on a farmout from Imperial Oil.

We are witnessing the emergence, then, of a strong regional gas play and an oil play.

And both are of major proportions.

Other success

The only other operator successful in the Delta region to date has been the team of Gulf Oil Canada Ltd. and Mobil Oil Canada Ltd. with a gas find southeast of the Delta at Parsons Lake (reportedly a rich find).

All gas finds have also reported condensate with the gas. Thus the possibility of an oil pipeline from the Delta region is quite real, given large-scale gas production and the presence of one big oil find on Richards Island, plus three more oil discoveries on Tuk Peninsula. There, Imperial has started to give farms; the first one went to Canadian Industrial Gas & Oil Ltd., on which Imperial's own rig will start a drilling program this winter.

Spending plans

Operations now proceeding smoothly during winter months are technically feasible even during the summer (according to Indian Affairs & Northern Development scientists) with the proper vehicles and tracks or balloon tires. Procedures have been mastered in the shallow water in and around the coastal areas, notably with the use of an air cushion vehicle.

The latter worked under contract last summer to PanCanadian Petroleum Ltd., which brought the craft over from Britain for the job. Chevron and Imperial have also used it.

At least 30 to 40 holes during the next 12 months will be drilled in the Arctic Islands. Panarctic will drill 18, farmers another five on Panarctic's lands and others at least another 10 elsewhere.

Panarctic expects to spend \$85 million. Other operators will spend at least another \$25 million. Panarctic has seven rigs under contract (including those on loan to others). Other operators have secured another six, but the total will increase next year, especially if more discoveries are made soon.

Offshore drilling will have to take place sooner or later since all permits carry commitments and since farmout obligations already exist, for instance for the Texan oil interests which are obligated to drill an offshore well on a farmout from Dome Petroleum Ltd. Trouble is that, although four proposals for types of offshore drilling operations have been designed, the government does not at all seem ready to grant permission to the two systems which have been proposed, one by Lamar Hunt and the Texas interests. And the other by a group of nine companies organized in a task force.

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Aquitaine Co. of Canada; Amoco Canada; Elf Oil; Texaco Exploration and Mobil Canada.

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ering three trillion cubic feet as the necessary reserve. But the pipeline is only possible if it supplies the U.S. East Coast market. The proximity of the two finds, however, is an important plus. Shell Canada has one

discovery with four pay zones (three gas and one oil) 30 miles east from Sable in the Primrose structure. And it is now drilling a stepout well which will decide the fate of this field.

Amoco and Imperial now have two rigs on the Grand Banks, one on loan from Shell. Mobil has sent its new rig to the Grand Banks as well, so that now three rigs are working off Newfoundland, and one off

Nova Scotia.

A land rig is working on the island-based production platform Mobil has erected on Sable Island.

Next year, as many as seven rigs might be drilling in eastern coastal waters.

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These rigs, two are drilling for Horn River Resources (as Drillaric Ventures) on Axel Heiberg Island, one for Imperial on the same island, one for Panarctic on Ellesmere Island near the Romulus Discovery well of the first free oil in the islands. Sun Oil and partners, Gulf Oil and Global Marine, are drilling on a newly discovered island, Linckens Island, southwest of Amund Ringnes Island.

Another rig is drilling for Dome on King Christian Island, one for Gulf on Elles Ringnes Island. Two are drilling for Panarctic on the same island, one for Panarctic on Sabine Peninsula of Melville Island, one for Dome on Dundas Peninsula on Southern Melville Island, and one for Demex on Banks Island.

On the East Coast, Mobil Oil and Texas Eastern Transmission now have two discoveries — one on Sable Island, and the other in the Thebaud structure, six miles southwest of the island.

The Sable discovery is in two major intervals or formations, containing a minimum of 18 or more pay zones. The Thebaud discovery appears to be in one formation with at least five pay zones. The Mobil-Texaco Eastern team may now have enough gas to warrant a 30-inch pipeline to U.S. export markets — consid-

Strong play for oil AND gas

Here is who is doing what, where, and when:

Imperial Oil Ltd. started the Mackenzie Delta play at the southern shore of the Arctic Beaufort Sea with the discovery of oil at Atkinson Point, east of the Tuktoyaktuk Peninsula, in early 1970.

H-25 was one of the significant strikes on the North American mainland. This strike, at IOE Atkinson Pt. H-25, was the northernmost oil strike in Canada. It was also the first proof of the hydrocarbon potential present at the Arctic coast of the mainland.

The second important strike was Atkinson Point. This was followed by a dual-zone oil strike (one zone also contains some gas) at Mayo-

Oil industry attention swinging to tar sands

The Athabasca tar sands — Canada's second and still largely untapped source of petroleum reserves — are at last coming into their own. Diminishing North American reserves of conventional crude oil and natural gas

are swaying oil industry attention to the huge amounts of synthetic oil locked up in the tar sands. A recent study places recoverable reserves of synthetic oil from the tar sands at 280,000 million barrels.

Some 60 billion barrels are recoverable using open-pit mining methods, the remainder from underground recovery processes.

Shell Canada Ltd. estimates the reserves would provide a production poten-

tial of 25 million barrels of synthetic oil daily over a 30-year period (five million barrels of synthetic oil daily from open-pit mining methods and the remainder from underground recovery methods).

Both Imperial Oil Ltd. and Shell Canada forecast rapidly rising tar sands production at recent Alberta Energy Board hearings.

They estimated production of synthetic crude of one million barrels daily by 1985 and 3.5 million barrels per day by the end of the cen-

tury, when 10-20 large plants could be in operation.

Next to the \$500 million tar sands project of Syncrude Canada Ltd., now in an advanced planning stage, Shell Canada's project is furthest along the planning road.

Shell is looking at two possible tar sands projects, one based on reserves east of the Athabasca River and the other on deeply embedded deposits in the Peace River area.

Preliminary planning is for two projects of 100,000 barrels per day (b/d) capacity each. Each of the developments would represent an investment of around \$400 million.

Shell is expected to make its application for a provincial permit to proceed with the projects within 1½ years.

The company has already satisfied itself on the Athabasca reserves but further core drilling is being carried out for engineering and economic assessment. At the same time, drilling and field testing have been completed

on the Peace River deposits.

Work on the Syncrude Canada Ltd. project involves preparation of bid contracts for contractors, testing of procedures and machinery at the tar sands site to determine how critical material-handling processes will work under various conditions and negotiations with the Alberta government on royalties and incentives.

Syncrude officials say

they will wait for feedback from the proposed subcontractors of the project and an Alberta government decision on royalty payments before they decide to go ahead with the project. The Alberta government is not expected to announce its decision on tar sands royalty payments until next spring.

Other companies with Athabasca tar sands acreage carrying out reserves assessment include Amoco Canada Petroleum Co., Home Oil Co. and Standard Oil Co. of Indiana.

Home has been carrying

out a 69-well shallow drilling and coring program on its acreage northeast of Fort McMurray, Alta., to evaluate the potential of its 87½% interest in leases comprising 37,715 acres. The company has been satisfied with drilling results to date.

The steadily improving financial picture at Great Canadian Oil Sands Ltd.'s operation could produce a break-even position by the last quarter this year. Third-quarter loss was reduced to \$510,000 vs a loss of \$3,789,000 in the same quarter last year. Revenue was \$14,952,000 vs \$11,333,000 in the third quarter 1971.

Production in the period averaged 49,500 barrels per day, a 22% increase from the same period last year.

The company has applied to the Alberta Energy Conservation Board to increase its authorized output from 45,000 b/d to 65,000 b/d.

The recent 10c-a-barrel hike in the price of conventional Canadian crude oil is expected to be followed by a similar increase in prices paid for GCO's synthetic crude. This, along with rising production and generally improved efficiency, is expected to soon put the company into the black.

What our pipeline firms are doing

Pacific Gas Transmission Co. has approved sale of 260,000 shares of Alberta Natural Gas Co. to a Calgary-based company, Convergents Ltd. at a price of one dollar per share.

By doing this, Pacific Gas Transmission has reduced its holdings of Alberta Natural Gas to 45%. This means a Canadian resident will now own 55% of the pipeline company which operates a gas pipeline system from the southwest corner of Alberta across the corner of British Columbia to the U.S. border.

Net income for the first nine months this year was \$1,463,000, equal to \$1.23 a common share vs \$1,220,000 and \$1.02 respectively in same period a year ago.

Nine months earnings rose 11.8% to \$23,300,000.

Alberta Gas Trunk Line Co. plans further financing through the sale of a \$35 million 8½% sinking fund debenture maturing Dec. 1, 1992. Proceeds of issue will be used to complete long-term financing of the 1972 expansion program.

Commencing Jan. 1, 1973, the company will include in its charges to some customers a billing for deferred income taxes. Initial amount of the billing will be at least \$5 million per year, equal to about 0.25c per mcf.

The company has also decided to increase its rate of return component of its charges by one quarter point to 9%, effective Jan. 1. The new rate of return will boost 1973 estimated income by around \$1.1 million.

For the nine-month period this year, average daily throughput was 4,180 million cubic feet, up 14% from same period last year.

Expansion in service facilities this year will provide for an increase in average daily throughput next year of 220 million cubic feet.

Earnings in the first nine months this year were equivalent to 85¢ per common share, up from 46¢ in the same period a year ago.

Interprovincial Pipe Co. is planning another big expansion program in its service next year. Subject to National Energy Board approval, company will increase capacity of its pipeline system by 120,000 barrels per day.

Daily deliveries through the system this year will average a record 381,100 barrels of crude oil, 4,400 barrels of jet fuel and 9,100 barrels of propane.

The program will be accomplished by fully powering the present two-line system from Superior and adding pipeline sections and horsepower between Edmonton and Superior and out of Sarnia, Ont.

The program will include addition of 41 pumping units and 225 miles of 48-inch diameter line between Edmonton and 32 miles of 20-inch line between Sarnia and Toronto.

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In its current application before the National Energy Board seeking the 9% rate of return the company has requested a approval for "tracking" clauses which would permit certain additional costs anticipated in 1973 to be passed on to the distributor customers.

"Without such a procedure or an alternative method," Kerr said, "TransCanada earnings will fall sharply lower in 1973."

Capital expenditures for 1972 are now estimated at \$270 million. This program is now nearing completion. The 1973 expansion program is estimated to cost over \$200 million.

In the first nine months this year common share earnings were \$2.15, vs \$1.19 in same period a year ago. Net income on a fully diluted basis were \$1.91 and \$1.17 respectively.

The improvement reflects high capacity operations in Northern Ontario, lower financing costs and higher prices received under certain sales contracts.

"Notwithstanding the improvement," James S. Kerr, chairman, said, "additional revenues will be required to offset increasing gas supply costs and higher costs to result from the large capital expansion program now under way."

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Despite a sharply improved earnings trend this year TransCanada PipeLines Ltd.'s rate of return is below the 9% level permitted by the National Energy Board.

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* One of the larger "bergs" sited by a research team from the Faculty of Engineering of Memorial University.



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